

**REMARKS/ARGUMENTS**

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-42, 47, and 48 are presently active; Claims 1, 19, 25, 33, 41, 47, and 48 have been presently amended, Claims 43-46, 49, and 50 having been withdrawn by a Restriction Requirement.

In the outstanding Office Action, the specification was objected to. Claims 1, 19, 25, 33, 41, 42, and 48 were objected to due to informalities. Claims 1-42, 47, and 48 were rejected under 35 U.S.C. § 112, first paragraph, for failing to comply with the written description requirement. Claims 47, and 48 were rejected under 35 U.S.C. § 112, second paragraph, for being indefinite. Claims 1-24, 41, 42, 47, and 48 were rejected under 35 U.S.C. § 101 because the claimed invention is directed to non-statutory subject matter. Claims 1, 7, 8, 11-16, 25, 27, 33, 35, and 47 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Publication No. 2003/0055523 to Bunkofske et al in view U.S. Publication No. 2002/0107858 to Lundahl et al and further in view of U.S. Publication No. 2005/0055175 to Jahns et al. Claims 2-6, 19-23, 26, and 34 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bunkofske et al in view of Lundahl et al, and Jahns et al and further in view of U.S. Pat. No. 6,622,059 to Toprac et al. Claims 9, 10, 28, and 36 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bunkofske et al in view of Lundahl et al, and Jahns et al and further in view of U.S. Pat. No. 5,796,606 to Spring. Claims 17, 18, 29-32, 37-42, and 48 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bunkofske et al in view of Lundahl et al and Jahns et al and further in view of U.S. Publication No. 2003/0144746 to Hsiung et al. Claim 24 was rejected under 35 U.S.C. § 102(a) as being unpatentable over Bunkofske et al, Lundahl et al, Jahns et al, and Toprac et al in view of U.S. Pat. No. 5,796,6007 to Spring.

Applicant's acknowledge with appreciation the courtesy of Examiner West to interview this case on February 9, 2007 during which time the issues in the outstanding Office Action were discussed as substantially summarized hereinafter.

Regarding the statutory rejection, the claims have been amended to define at least one tangible result achieved in the presently claimed inventions. Claim 1 for instance defines a step that provides an output assessing the process being performed in the processing system. Non-limiting support for this feature is found in Applicant's numbered paragraphs [0098] and [0104]. Hence, it is respectfully submitted that presently amended Claims 1-24, 41, 42, 47, and 48 define statutory subject matter.

Regarding the objection to the specification, the informalities identified in the Office Action have been addressed in the manner provisionally agreed to during the interview. Thus, the objection to the specification has been overcome.

Regarding the claim objections, the informalities identified in the Office Action have been addressed in the manner provisionally agreed to during the interview. Thus, the claim objections have been overcome.

Regarding the 35 U.S.C. § 112, second paragraph, rejection, the issues identified in the Office Action have been addressed in the manner provisionally agreed to during the interview. Thus, the 35 U.S.C. § 112, second paragraph, rejection has been overcome.

Regarding the 35 U.S.C. § 112, first paragraph, rejection, the claims have been amended to associate the PCA model initially recited in the claims with a first set of substrate runs having performed a process in the processing system, in the manner provisionally agreed to during the interview. Support for this subject matter is seen from Applicant's detailed discussion of the invention in numbered paragraphs [0086] and [0089] – [0095] of the specification, which describes (1) an illustrative first set of "500 substrates" and a second set including the other part of "all 3200 substrates," and (2) the updating of "mean values (utilized

for entering) for each summary statistic . . . from one observation to the next using a filter.”

Thus, the 35 U.S.C. § 112, first paragraph, rejection has been overcome.

Regarding the rejections on the merits, the independent claims define:

acquiring additional data from said processing system after said constructing step from a second set of substrate runs performing said process in the processing system, said additional data comprising an additional observation of said plurality of data parameters;

adjusting said centering coefficients at the time of each observation of the additional data from the second set by utilizing both said initial data and current data obtained from the additional observation from the process performed in the second set to produce updated adaptive centering coefficients for each of said data parameters in said PCA model;

applying said updated adaptive centering coefficients to each of said data parameters in said PCA model.

The outstanding Office Action states that the invention of Bunkofske et al and Lundahl et al is modified by the invention of Jahns et al to specify that the method acquire additional data from the processing system after constructing the PCA model to form adjusted data and adjusted centering/sealing coefficients.

However, as discussed during the interview, Jahns et al specifically disclose:

[0043] If it is determined in step 160 that sample matrix  $X_m$  for each model  $m$  is complete, then the plasma process fault detection module 100 proceeds to step 190. In step 190, principal component vectors  $p_i$  corresponding with each scan  $x_i$  are computed *for each model*. In this regard, *the principal components  $p_j$  are computed in accordance with the following expression:*

$$p_i = U_m^T * x_i \quad (1)$$

[0044] where superscript  $T$  indicates matrix transpose,  $*$  indicates matrix multiplication,  $i$  is the wafer index (e.g.,  $i=1, 2, 3$ , etc.) and  $m$  is the model index (e.g.  $m=1, 2, 3$ , or  $4$  in the case of the present embodiment). It will be appreciated that step 190 is not performed for a particular model until it is determined in step 160 that its sample matrix  $X_m$  is complete. However, once the model size is reached and  $U_m$  is obtained for a particular model in step 320, the principal components  $p_i$  corresponding with each scan  $x_i$  in the model may be computed. In computing the principal components  $p_i$  for the EP and nonEP models, matrix  $U_m$  is determined once initially for static models, and is periodically updated for dynamic models. Conditions for updating  $U_m$  and the calculation of  $U_m$  are described for steps 310 and 320, below. After step 190, the plasma process fault detection module 100 proceeds to step 200.

[0060] In step 310 it is determined whether conditions required in order to recalculate the  $U_m$  matrix for each of the dynamic model matrices  $X_3$  and  $X_4$  are met. In this regard, each time that a desired portion of the data in the sample matrices  $X_3$  and  $X_4$  for the dynamic models has been updated in steps 290 and 300, recalculation of  $U_m$  for the dynamic models may be undertaken. In the present embodiment, each time it is determined in step 310 that *half of the data* in the dynamic EP and nonEP model sample matrices  $X_3$  and  $X_4$  has been updated, the conditions required for recalculating  $U_m$  for each dynamic model matrix  $X_3$  and  $X_4$  are met. By way of example, where the dynamic model size is 100, each time a total of 50 scans have been deleted and 50 new scans added (*i.e. after scan 150 is added, after scan 200 is added, after scan 250 is added, etc.*), the conditions required for recalculating  $U_m$  are met. As may be appreciated, the conditions required in step 310 may differ (e.g., when a third or a quarter of the scans have been updated recalculation may be undertaken). If it is determined in step 310 that the conditions required to *recalculate  $U_m$  for each of the dynamic model matrices  $X_3$  and  $X_4$*  are not met, then the plasma process fault detection module 100 proceeds to step 340. If it is determined in step 310 that the conditions required to recalculate the principal components for each of the dynamic model matrices  $X_3$  and  $X_4$  are met, then the plasma process fault detection module 100 proceeds to step 320. [Emphasis added]

Thus, Jahns et al teach updating the principle components model by *recalculating  $U_m$  for each of the dynamic model matrices  $X_3$  and  $X_4$* . Hence, Jahns et al teach a process where the principle components model is periodically updated (i.e.,  $p_i = U_m T^* x_i$  is periodically updated). Jahns et al do not teach adjusting centering coefficients at the time of each observation of the additional data from a second set of substrate runs to produce updated adaptive centering coefficients and applying the updated adaptive centering coefficients to each of the data parameters in the PCA model constructed from a first set of substrate runs, preceding the second set.

Hence, a combination of Bunkofske, Lundahl et al, and Jahns et al would not produce or suggest the claimed invention in which, for each additional data observation, updated adaptive centering coefficients (based on the new data) are applied to the initial PCA model.

Moreover, submitted herewith is a Declaration under 37 C.F.R. § 1.131 showing proof of prior conception of the claimed invention and diligence over the two days from the time of


the filing of Jahns et al to the filing date of the present application. Thus, based on this evidence, Jahns et al should be removed as a prior art reference.

Thus, for all these reasons, Claims 1, 19, 25, 33, 41, 47, and 48 and the claims dependent therefrom are believed to patentably define over the references in the outstanding Office Action.

Consequently, in view of the present amendment and in light of the above discussions, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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